

REMARKS:

- 1) Entry and consideration of this Response After Final are respectfully requested. This Response does not raise any new issues that would require further search or consideration. This Response does not further amend the claims. Instead, this Response merely replies to the issues already addressed in the Final Office Action. Accordingly, entry and consideration of this Response after the Final Status are proper.
- 2) Referring to items 4) and 6) of the Office Action Summary, note that claims 4 to 6 were previously canceled, so that only claims 1 to 3 and 7 to 20 are pending.
- 3) Referring to the bottom of page 2 of the Office Action, the Examiner's refusal to consider and acknowledge reference "AH" (DE 195 29 152) cited in the IDS of December 18, 2001 is respectfully traversed.

The IDS of December 18, 2001 enclosed and referenced the English version of the International Search Report issued in the PCT International Application corresponding to this US National Phase Application. As pointed out in the IDS, the foreign language reference "AH" was categorized in a relevance category in the enclosed International Search Report, and further the Search Report identified the portions of the reference regarded as particularly relevant, and the claims affected. According to M.P.E.P. §609(III)(A)(3), that satisfies the requirement for a concise explanation of the relevance:

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"Where the information listed is not in the English language, but was cited in a search report or other action by a foreign patent office in a counterpart foreign application, the requirement for a concise explanation of relevance can be satisfied by submitting an English-language version of the search report or action which indicates the degree of relevance found by the foreign office. This may be an explanation of which portion of the reference is particularly relevant, to which claims it applies, or merely an "X", "Y", or "A" indication on a Search Report".(M.P.E.P. §609(III)(A)(3)).

Furthermore, M.P.E.P. §609(II) expressly states "The Examiner will consider the documents cited in the international search report in a PCT national stage application...".

For the above reasons, the IDS of December 18, 2001 was fully in compliance with all requirements. Accordingly, the Examiner is respectfully requested to consider reference "AH" and to return a fully initialed, signed and dated acknowledgment copy of the Form PTO-1449 of December 18, 2001.

- 4) Referring to the bottom of page 4 of the Office Action, the allowance of claims 11 to 20 is appreciated. The allowed claims are maintained without amendment.
- 5) Referring to the first three paragraphs on page 2 of the Office Action, the Examiner's explanations are appreciated, but the underlying assertions are respectfully traversed.

The Examiner stated "it is noted that the features upon which applicant relies (i.e., obtaining springs with equal total spring energy) are not recited in the rejected claim(s)".

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Contrary to this assertion, independent claim 1 directed to an electromagnetic actuator expressly recites that "the springs (61, 62) are pre-stressed in such a manner, so that the same energy (A1, A2) is stored in both springs ...". This is an essential feature of the inventive electromagnetic actuator and is expressly and clearly recited as a limitation in claim 1. Namely, the claimed actuator has pre-stressed springs, which have been particularly pre-stressed so that the same energy is stored in both springs in connection with a compression of the springs prescribed by the stroke travel distance of the armature. These are express physical, actually-existing features of the claimed actuator, which neither are disclosed nor would have been suggested by the prior art.

Similarly, independent claim 7 directed to a method for adjusting an electromagnetic actuator expressly recites a step in which "the pre-stressing (F10, F20) of one or both springs (61, 62) is set in such a manner so that the same energy (A1, A2) is stored in both springs". This is an essential step of the inventive method that is clearly and expressly recited in claim 7, and neither is disclosed nor would have been suggested by the prior art.

The Examiner has asserted "*applicant has not claimed any specific structure for pre-stressing the springs; applicant merely claims the spring is pre-stressed*". In this regard, the important feature of the invention is that the springs are pre-stressed to a particular pre-stressed state, namely so that the same energy is stored in both springs when the springs are compressed through the stroke travel of the armature. It is not

particularly significant (in the independent claims) what "specific structure" is used for pre-stressing the springs in this manner, namely what tools are used to achieve this, or the shims or the like that are included in the actuator for pre-stressing the springs. Moreover, note that claims 8 to 10 actually do recite setting means, measuring means, and control means involved in pre-stressing the springs. These features are, however, not important in the independent claims, because the inventive pre-stressed condition of the springs as defined in the independent claims could be achieved in various different manners.

The Examiner has further asserted "*Tsuzuki et al. discloses that the same energy is stored in both springs when they are in the neutral position due to pre-stressing (col. 4, lines 52-55)*" (emphasis added). The Examiner's assertion is respectfully traversed as an incorrect restatement of the true disclosure of the reference. The actual disclosure of Tsuzuki et al. at col. 4, lines 52 to 55 (and throughout the reference) is that "the biasing force of both springs 21, 22 is set at an equal value..." in the neutral position (col. 4, lines 52 to 53). It is very important to recognize that ENERGY and FORCE are not the same thing, and one does not imply the other. Further details of this important distinction will be discussed below in connection with the rejection applying Tsuzuki et al.

The above general points are significant also in overcoming the prior art rejections, as will be discussed next.

- 6) Referring to page 3 of the Office Action, the rejection of claims 1 to 3 as anticipated by Tsuzuki et al. is respectfully traversed.

As mentioned above, present independent claim 1 expressly recites that the two springs of the actuator are pre-stressed in such a manner so that the same ENERGY is stored in both springs in connection with a compression of the springs defined by the stroke travel distance of the armature. The Examiner has asserted that Tsuzuki et al. disclose such a feature at col. 4, lines 52 to 55. As pointed out above, that assertion is an incorrect characterization of the reference. Actually, Tsuzuki et al. disclose that the two springs must be pre-stressed in such a manner so that the biasing FORCE of both springs is equal.

It is very important to recognize that **ENERGY** and **FORCE** are not the same thing. To the contrary, as a general matter,  $ENERGY = FORCE \times DISTANCE$ . Thus, in the context of the pre-stressed springs according to Tsuzuki et al. or according to the invention, the energy stored in a spring is given by the stressing force multiplied by (i.e. or integrated over) the compression distance of the spring. The distance that a given spring will be compressed by application of a given force depends on the spring constant (or spring characteristic) of that spring.

Thus, two springs having different spring constants will store different amounts of energy when the same force is applied to these two springs. Consider the case of a typical helical first spring having some typical moderate spring constant, pressing against a second spring having a very high spring constant (i.e. a very "hard" or "stiff" spring, e.g. a solid

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metal rod or pipe as an extreme case). If these two "springs" are pressed axially together with a given force, so that the same force is necessarily applied to both springs through the action and reaction of the two springs on each other, it will be seen that the helical first spring is compressed through a certain compression distance, and the very hard second "spring" (i.e. the solid metal rod or pipe) is not compressed by any discernible or significant amount. As a result, it will be seen that the typical helical first spring has stored a measurable amount of energy, while the very stiff second spring has not stored any measurable energy because the product of the applied force times the compression distance (equal zero) gives zero energy.

For this reason, such a system of two springs will not resonate or oscillate because of the mis-matched energy storage in the two springs, despite the fact that the two springs are pre-stressed so that the biasing force on the two springs is equal (according to Tsuzuki et al.). This example represents an extreme case, but the same principle applies to any arrangement of two springs.

Every individual spring has its own spring constant. Even the individual springs of a given type or model or batch of springs will have slight variations in their spring constants. Even if these springs nominally have (approximately) the "same" spring constant, there will be slight differences. Thus, when two of such springs are pre-stressed by the same biasing force, the energy stored in each spring will be different from the energy stored in the other spring.

Since Tsuzuki et al. do not provide any suggestion toward, or any means for carrying out, a measurement or evaluation of the stored energy, or the spring constant, or the integral of the force over the distance, there would have been no suggestion toward achieving a pre-stressing of the two springs of an actuator so that the same energy would be stored therein over the compression of the springs given by the stroke travel distance. To the contrary, Tsuzuki et al. expressly require that the biasing force of both springs must be set at an equal value. That is conceptually and actually very different from setting the pre-stress so that the stored energy will be equal in the two springs.

Furthermore, applicants' remarks and arguments regarding Tsuzuki et al. as set forth in the prior Response of August 27, 2003 are expressly reasserted and incorporated herein by reference.

For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 1 to 3 as anticipated by Tsuzuki et al.

- 7) Regarding pages 3 to 4 of the Action, the rejection of claims 1 and 7 to 10 as anticipated by Schmitz is respectfully traversed.

Present independent claim 1 directed to an actuator expressly recites that the two springs are pre-stressed in such a manner so as to store the same **energy** as discussed above. Independent claim 7 directed to a method for adjusting an electromagnetic actuator expressly recites a method step of pre-stressing one or both of the springs in such a manner so that

the same **energy** is stored in both springs. These features are not disclosed and would not have been suggested by Schmitz.

The Examiner has asserted that Schmitz discloses two springs being pre-stressed in such a manner so as to store the same amount of energy at col. 3, lines 58 to 67. This is a mis-characterization of the true disclosure of the reference. Instead, Schmitz discloses that the armature is held in a mid position between the two electromagnets by the resetting springs in a de-energized state of the electromagnets. This particularly involves the forces of the two counteracting springs being in equilibrium (col. 4, lines 5 and 6).

Schmitz does not suggest anything about the energy stored in the springs. Also, Schmitz does not disclose or suggest any method steps, or means for carrying out a pre-stressing according to the invention, such that the same energy will be stored in both springs when they are compressed through the stroke travel distance. To achieve this, it would be necessary to measure the energy, e.g. by measuring the force and integrating the force over the compression distance to calculate the stored energy. Schmitz discloses nothing in this regard.

The Examiner has asserted that col. 6, lines 16 to 29 of Schmitz discloses means for measuring the progressions of the spring forces. That is not a true characterization of the disclosure. Instead, Schmitz merely discloses sensing the moment of impact of the armature striking against the pole face by measuring the sound or noise generated by such an impact. This involves the conversion of the kinetic energy of the armature to soundwave energy (col. 6, lines 28 and 29). The speed and the



kinetic energy of the armature, and thus the moment of impact, are dependent on the level of the actuating current applied to the electromagnets (col. 6, lines 1 to 29). This aims to achieve the intended setting of the rest position of the armature between the magnets with equal spring forces, as discussed above. It is assumed that the Examiner found this text citation with a word search for the search term "energy" and the like, but the actual content and context of this disclosure has nothing to do with the subject matter of the present invention.

Applicants' further remarks and arguments regarding Schmitz as set forth in the prior Response of August 27, 2003 are expressly reasserted and incorporated herein by reference.

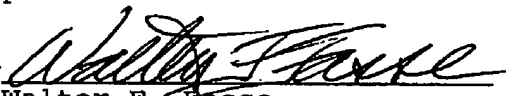
For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 1 and 7 to 10 as anticipated by Schmitz.

- 8) Favorable reconsideration and allowance of the application, including all present claims 1 to 3 and 7 to 20, are respectfully requested.

Respectfully submitted,  
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Applicant

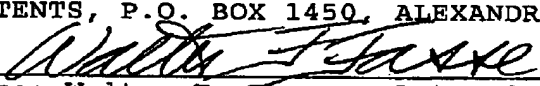
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I hereby certify that this correspondence with all indicated enclosures is being transmitted by telefax to (703) 872-9306 on the date indicated below, and is addressed to: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450.

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